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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,816	09/30/2003	Filippo Marino	02-CT-232	3072

25235 7590 05/05/2005

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EXAMINER	
RILEY, SHAWN	

ART UNIT	PAPER NUMBER
2838	

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/676,816	MARINO ET AL.	
	Examiner	Art Unit	
	Shawn Riley	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response

1. Applicants remarks of 30 March 2005 have been considered but not deemed persuasive. Several things should be made clear to the applicants directly. First, the suggestion that a pwm device operates as a linear modulator (i.e., there is linear modulation) while within a prefixed value range is at best a poorly worded claim. PWM are by definition switching modulators which is by definition not a linear modulator. A linear modulator does not sent a switching signal (e.g., a pwm, pfm, pam, etc) but instead sends a drive signal that linearly increases or decreases. Therefore, when applicants wish to be their own lexicographer, it is reasonable for the examiner to apply his terms loosely also.

Applicants also state the following:

> It is submitted that within the normal mode of operation, some PWM systems, particularly DC-to-DC converters as claimed, can and do have a linear mode of operation. In a DC-tO-DC converter the duty cycle is normally linearly modulated with an input signal and the gain of the PWM modulator is constant. PWM systems can also have various non-linear aspects as well, depending upon the specific design used and how the signals are modulated.

So apparently applicants acknowledge, using their own definition of what constitutes a linear and non-linear modulation, that some dc-dc converters do operate in both cycles. Yet applicants never point out why the cited prior art does not operate as a linear and non-linear cycle. In fact, it is not clear applicants are clear as to what a linear or non-linear cycle is. How can applicants contend that Chen does not show a linear and non-linear when applicants do not recite (know) what is the difference between the two is and simply recite that Chen (although applicants acknowledge that some dc-dc converters do have linear and non-linear) does not show a linear and non-linear mode.

As stated previously, and taken in context of claim's wording, it is deemed a reasonable position by the examiner to define a linear mode as a mode where in the feedback does not influence the output until the output leaves a prefixed value range. For at least the above reasons, this action is made final.

Claim Rejections - 35 U.S.C. § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-17 are rejected under 35 U.S.C. §102(b) as being fully anticipated by Chen et al. (U.S. Patent 6,005,377). Chen et al.shows, (in, e.g., the(ir) figure(s) 1-3 and corresponding disclosure)

As to claim 1;

A digital control apparatus for a switching DC-DC converter including at least one power transistor (108) and being able to provide a regulated output voltage (V_{OUT}+) on a load, said apparatus comprising: digital control means having for receiving a digital reference signal (117 is described as a digital signal) and for providing a modulating signal (output of 116); and a PWM device (128/106) for receiving said modulating signal and providing a square wave signal (by definition, a pulse-width signal is a square wave that is modulated by width) for driving the power transistor of said DC-DC converter, wherein

said digital means operates on the square wave signal such that there is a non-linear modulation (taken as a change in width of the modulated signal) only when the value of a signal on the load (V_{OUT}+ or I_{SWITCH}) is lower or higher than a prefixed value range (again, this is by definition how a pwm system works, when a variable falls outside a predetermined range the modulation of the switching transistor is changed to cause the variable to 'conform' to the predetermined range).

As to claim 2;

The apparatus according to claim 1, further comprising means for driving the power transistor including means for determining the on time and the off time of said power transistor (again, this is accomplished by at least the pwm 128).

As to claim 3;

The apparatus according to claim 2, wherein said digital control means comprises means to increase or decrease the on time of said transistor (see above rejection of claim 1).

As to claim 4;

The apparatus according to claim 3, wherein said means to increase or decrease the on time of said transistor further comprises means to increase or the decrease the value of the signal on the load with respect to a predetermined

value range (see above rejection of claim 1).

As to claim 5;

The apparatus according to claim 1, wherein said digital means further comprises means for providing a step ramp signal (as seen in figure 2 and described in the specification vis à vis step 208, at column 6 lines34-45, a specific ramp signal is supplied depending the compensated signal which is therefore able to produce a step ramp signal, for say, sequentially increasing/decreasing compensation signals).

As to claim 6;

The apparatus according to claim 5, wherein the amplitude and the duration of said step ramp signal are programmable (given that the ramp look-up table is a table, it (the table) may be programmed to change the amplitude/duration thereof).

As to claim 7;

The apparatus according to claim 1, wherein said signal (V_{OUT}+ or I_{SWITCH}) on the load comprises the output signal of the DC-DC converter.

As to claim 8;

The apparatus according to claim 7, wherein said digital control means comprise numeric comparators (comparator 116 is seen as a numeric comparator as it takes in a digital signal and compares that signal to another digital signal from 117) able to compare said output signal of the DC-DC converter with a predetermined voltage value range (based in part on 117).

As to claim 9;

The apparatus according to claim 1, wherein said signal on the load comprises a current signal (I_{SWITCH}).

As to claim 10;

The apparatus according to claim 9, wherein said digital control means comprise numeric comparators able to compare a signal proportional to the current signal (comparator 116 is seen as a numeric comparator as it takes in a digital signal and compares that signal to another current signal-changed to digital-from 110) on the load with a predetermined signal value range (based in part on 117).

As to claim 11;

The apparatus according to claim 1, wherein said PWM device comprises an analog device (the driver, 106 is an analog device).

As to claim 12;

The apparatus according to claim 11, further comprising means for generating a ramp signal (ramp signal generated as previously discussed from 126/124) to the input to said analog PWM device.

As to claim 13;

The apparatus according to claim 1, further comprising a digital-to-analog converter (the step of 208 produced an output analog signal) able to convert the digital signals to the input (through123/124) to said PWM device.

As to claim 14;

The apparatus according to claim 1, wherein said PWM device (the 'front' part of the device, that is 128 is digital) is a digital device.

As to claim 15;

The apparatus according to claim 1, wherein said DC-DC converter comprises at least one inductor (103) having a first terminal connected with a non-drivable terminal of said power transistor and a second terminal connected (connected through 113) with a capacitor (115) placed in parallel with the load (a note for applicants, notwithstanding that applicant discloses a buck regulator and Chen et al disclose a boost, the differences are seen as well known in the art and, if further claimed later would not be seen as patentable).

As to claim 16;

The apparatus according to claim 15, further comprising a voltage positioning block (including 116) having an input for receiving said output voltage (see voltage scaler Av) and a voltage proportional to the current (see current scaler A_I) flowing through the inductor and an output for providing the difference voltage (output of 116) to the input of said control digital means.

As to claim 17;

The apparatus according to claim 16, wherein said voltage difference is subtracted from the reference signal (this is how a comparator works, the difference of one input(s) is taken from the other intput(s)).

3. Claims 18-20 are rejected under 35 U.S.C. §102(b) as being fully anticipated by Watanabe et al. (U.S. Patent 5,705,920). Watanabe et al.shows, (in, e.g., the(ir) figure(s) 2 and corresponding disclosure)

As to claim 18;

A digitally controlled DC-DC converter comprising: a summer (23, column 2 line 36) for receiving a reference signal (24); a digital control block (including 24/31/35/etc.) coupled to said summer; a DAC coupled to said digital control block (30-31); a PWM circuit coupled to said DAC (through 23/22/21); a DC-DC converter (including 10) coupled to said PWM circuit, having an output (at 15) for

providing an output signal to a load; and feedback means (including 27) for providing said output signal to said summer, wherein said digital control block provides non-linear modulation only when the value of a signal on the load is lower or higher than a predetermined value (this is how pwm work).

As to claim 19;

The DC-DC converter of claim 18 wherein said feedback means comprises an ADC (27).

As to claim 20;

The DC-DC converter of claim 18 wherein said feedback means comprises an adaptive voltage positioning block (taken as 27/28/30).

Allowable Subject Matter

4. No claims are allowable over the prior art of record.

Conclusion

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry from other than the applicant/attorney of record concerning this communication or earlier communications from the Examiner should be directed to the Patent Electronic Business Center (EBC) at 1.866.217.9197. Any inquiry from a member of the press concerning this communication or earlier communications from the Examiner or the application should be directed to the Office of Public Affairs at 703.305.8341. Any inquiry from the applicant or an attorney of record concerning this communication or earlier communications from the Examiner should be directed to Examiner Riley whose telephone number is 571.272.2083. The Examiner can normally be reached Monday through Thursday from 7:30-6:00 p.m. Eastern Standard Time. The Examiner's Supervisor is Mike Sherry who can be reached at 571.272.2084. Any inquiry about a case's location, retrieval of a case, or receipt of an amendment into a case or information regarding sent correspondence to a case **should be directed to 2800's Customer Service Center** at 571.272.2815. Any papers to be sent by fax MUST BE sent to fax number 703.872.9306. Any inquiry of a general nature of this application should be **directed to the Group receptionist** whose telephone number is 571.272.2800. Status information of cases may be found at http://pair-direct.uspto.gov wherein unpublished application information is found through private PAIR and published application information is found through public PAIR. Further help on using the PAIR system is available at 1.866.217.9197 (Electronic Business Center).

April 05

Shawn Riley
Primary Examiner